MULTIMEDIA INFORMATICS

MMI 727– Deep Learning: Methods and Applications

SYLLABUS

Course Information

Course Name & Credit:	MMI 727– Deep Learning: Methods and Applications
Year, Semester:	2018-2019 Spring
Location & Time:	S-06 - Wednesday 13:40 - 16:30
Lecturer:	Prof. Dr. Alptekin Temizel, atemizel@metu.edu.tr

Course Objective

This course aims to give background knowledge on several topics related to deep learning and provide a laboratory environment for practical applications. Backpropagation, convolutional neural networks, generative adversarial networks, energy-based learning, optimization techniques, recurrent networks, long short-term memory (LSTM), Deep Reinforcement Learning are some of the core topics that will be covered through the lectures. The course aims to balance theory and practice in that it will involve students implementing various algorithms, testing those algorithms under several domains and accessing GPU clouds during laboratory sessions to code the program examples using Tensorflow.

Textbook:

I. Goodfellow, Y. Bengio, and A. Courville. Deep Learning. MIT Press, 2016.

Reference Material:

CS231n: Convolutional Neural Networks for Visual Recognition - http://cs231n.stanford.edu/
Deep Learning Resources - https://deeplearning4j.org/deeplearningpapers

Attendance and Absences: Attendance is expected and will be taken each class. Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.

Grade Distribution:

Final Examination	20%
Midterm examination	20%
Lab reports and assignments	50%
Attendance	10%

Deliverables: Documents and necessary files of the assignments must be uploaded to ODTUClass by students before the specified due dates.

Late Submissions: Late submissions are accepted with a penalty of 10% grade decrease for each day delayed.

University Policies: All students are **expected to obey** the university code of integrity and avoid academic dishonesty or plagiarism

Weekly Schedule (Tentative)

Week	Date	
1	13 Feb	**Introduction to the Course and Fundamentals of Deep Learning**
2	20 Feb	**Introduction to Machine Learning** Introduction to Machine Learning Introduction to Neural Networks Introduction to Deep Learning
3	27 Feb	**Introduction to Deep Learning** Introduction to Deep Learning (Contd.), Deep Supervised Learning (Modular Approach)
4	6 Mar	**Lab** Backpropagation Logistic regression and Softmax Expression MNIST Handwritten Digit Recognition Object Detection
5	13 Mar	**Convolutional Neural Networks** History of Convolutional Networks Convolutional Networks and Computer Vision Audio and Other Domains
6	20 Mar	**Convolutional Neural Networks** Convolutional Networks (Contd.) Structural Prediction and Natural Language Processing
7	27 Mar	**Midterm**
8	3 Apr	**Autoencoders** Auto-Encoders Sparse Coding
9	10 Apr	**Optimization Techniques** Gradient Descent Variants Optimization Algorithms
10	17 Apr	**Learning with Memory** Recurrent Neural Network Basics Sequential Data Modeling with Deep Learning
11	24 Apr	**Learning with Memory** Long-Short Term Memory (LSTM) Applications of LSTMs
12	1 May	**NO LECTURE – PUBLIC HOLIDAY**
13	8 May	**Generative Models** PixelRNN/CNN Variational Autoencoders Generative Adversarial Networks
14	15 May	**Deep Reinforcement Learning** Reinforcement Learning Markov Decision Processes Policy gradients Q-Learning Actor-Critic